

State policy environment and the dental safety net: a case study of professional practice environments' effect on dental service availability in Federally Qualified Health Centers

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Abstract

Objectives: To determine whether and to what extent the state policy environment for the dental hygiene workforce affects the availability of dental services at Federally Qualified Health Centers (FQHCs).

Methods: We examined data drawn from the Uniform Data System on 1,135 unique FQHC grantees receiving community health center funding from the U.S. Health Center program between 2004 and 2012. The Dental Hygiene Professional Practice Index was used to quantify variations in state policy environment. We then examined the influence of state policy environment on the availability of dental care through generalized linear mixed-effects models.

Results: Approximately 80% of FQHCs reported delivering dental services. We consistently observed that FQHCs with favorable levels of state support had the highest proportion of FQHCs that delivered dental services, even more so than FQHCs with extremely high support. FQHCs located in the most restrictive states had 0.28 the odds of delivering dental services as did those located in the most supportive states.

Conclusions: The state policy environment for the dental hygiene workforce is likely associated with the availability of dental services at FQHCs. The greatest proportion of FQHCs delivering dental services was found in states with policy provisions supporting professional independence in public health settings. Nevertheless, additional research is needed to understand the specific mechanism by which these policies affect FQHCs.

Introduction

The oral health workforce is the foundation of the US oral health care delivery system. All policies that define and regulate this workforce influence oral health system capacity and ultimately access to dental care. A key component of the oral health workforce is dental hygienists. Focused on dental disease prevention, oral health promotion, and periodontal disease management, dental hygienists play a crucial role in promoting, supporting, and maintaining the population's oral health.

Many educational and professional practice policies directly influence the functioning and size of the dental

hygiene workforce. National accreditation standards for dental hygiene education are overseen by the Commission on Dental Accreditation (CODA). The majority of dental hygienists in the US graduate from a CODA-accredited program, and as such are trained to nationally accepted standards. While dental hygiene education is determined at the national level, policies regulating professional practice are determined at the state-level through statutes and regulation by professional licensing boards (1). These state policies create the context for dental hygienists' professional practice within a state, and thereby are responsible for between-state variations in policy and regulation of

permitted clinical tasks, professional supervision requirements, structure of professional governance, and Medicaid reimbursement policies (2).

In other words, policy variations for the dental hygiene workforce promote variations in their professional practice, as well as where and under what conditions they may provide and be reimbursed for specified dental services. Such variations in turn influence oral health system capacity. For example, dental hygienists may be unique points of access to specified dental services—generally preventive—in states with policies supporting professional independence. Conversely, dental hygienists practicing in states with more restrictive professional practice policies are limited to delivering care at existing care points (e.g., dental offices) under the supervision of a licensed dentist. Policy-related variations in oral health system capacity should produce variations in access and ultimately in population oral health. Specifically, higher professional independence among dental hygienists should result in a more robust oral health care system with greater service availability.

This notion that state policy environment—namely, whether a state supports or restricts professional independence among dental hygienists—influences dental care access is supported by previous literature. Indeed, two studies identified a direct relation between-state policy environment (as quantified by the 2001 Dental Hygiene Professional Practice Index [DHPPI]) and dental care access—namely, dental care access within a state increased with support for professional independence among the dental hygiene workforce (2,3). However, it remains unknown whether policy variations influence oral health system capacity and access specifically within underserved communities.

Federally qualified health centers: a case study

Federally Qualified Health Centers (FQHCs) are the most important component of the dental safety net and play a critical role in reducing oral health disparities (4-7). These comprehensive primary health care facilities receive funding from the US Health Center Program at the Health Resource Services Administration (HRSA) and act as delivery vehicles for federal policy aimed at improving availability of and access to primary care, including dental services, in medically underserved communities (8).

FQHCs exist in all 50 states, the District of Columbia, and selected US territories. FQHCs' federal funding agreement requires them to "ensure" access to preventive dental services including oral hygiene instruction, oral prophylaxis, and topical fluoride (9,10). Not all, however, operate dental programs or provide these services directly to patients; instead, they establish collaborative agreements or contracts with community dental providers. Still, because transportation is a recog-

nized barrier to access for underserved populations (11), it is unlikely that FQHCs not offering dental programs onsite are able to ensure access as effectively as those that do. A recent policy brief from the UCLA Center for Health Policy Research reported as much: that is, the high no-show rates among health center patients referred for dental services related to transportation barriers and an inability to take time off work (12). These barriers are prevalent in both urban and rural settings. Furthermore, limited access to off-site specialty services may negatively influence health outcomes, especially for the medically underserved and poor (13).

All FQHCs abide the same federal funding requirements but are subject to varying state-level policy environments (e.g., state regulation of the dental hygiene workforce). In less restrictive states, FQHCs may deploy dental hygienists in school-based clinics and obtain reimbursement for services provided (5). In more restrictive states, dental hygienists cannot practice without direct supervision by a licensed dentist. The intersection of federal and state policy at FQHCs provides an ideal situation to study the unique impact of state policy on access to dental care within underserved communities.

Study objectives

Our primary objective is to determine whether state policy for the oral health workforce (specifically, the dental hygiene workforce) influences the availability of dental services within FQHCs in underserved communities. Notably, we did not focus on understanding which health professionals deliver specific health services within FQHCs; rather, we sought to understand the impact of state policy on oral health care delivery within organizations whose primary mission is prevention. As the professional focus of the dental hygiene workforce aligns with the preventive dental requirements of FQHCs, they were believed to be a suitable target of investigation.

Methods

Study framework and design

Aday and Andersen's *Framework for the Study of Access to Medical Care* is a widely accepted method of studying the impact of specific health policies on care access. This framework dictates that policy affects access by one of two means: 1) enhancing capacity for health care delivery through infrastructure or workforce initiatives or 2) enabling populations to gain access to care through social programs such as Medicaid (14). Changes in access associated with a given policy are quantified using health service utilization data. Herein, the FQHCs were the health policy of interest, as they represent delivery vehicles for policies aimed at improving health system capacity and access in medically underserved communities.

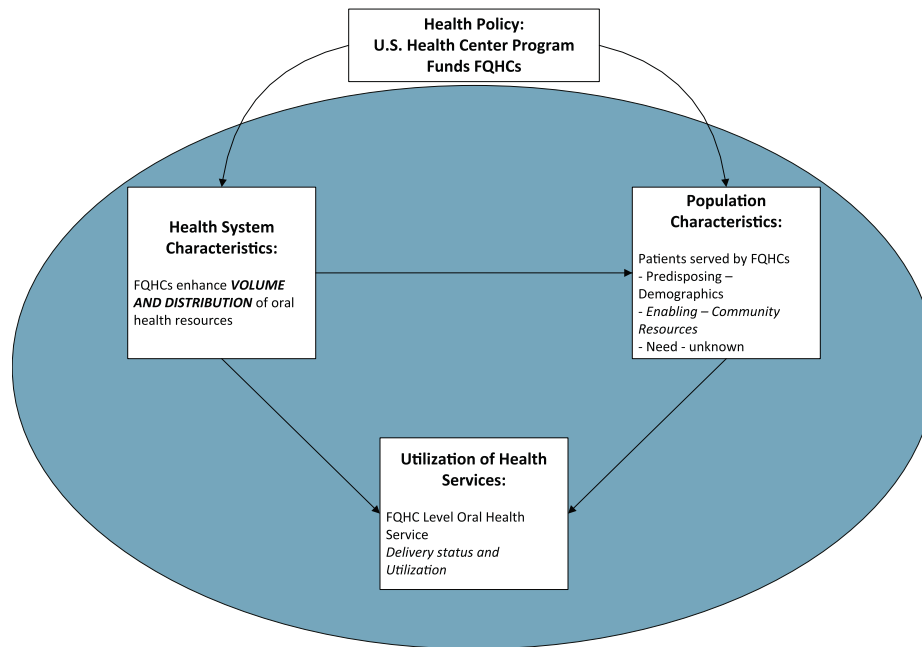


Figure 1 Adapted framework of Aday and Andersen illustrating FQHCs as the delivery vehicle for a federal policy.

To study state workforce policies' effect on FQHCs, we adapted the Aday and Andersen framework (Figure 1) to include a context-based level representing state policy environment and comprising health services delivery, access, and health. We use the adapted framework to determine whether and to what extent state policy environment serves as an intermediary in the relationship between the policy of interest (FQHC) and intended outcomes (availability of dental services).

We examined data on 1,135 FQHC grantees (hereafter, FQHCs) that received community health center funding from the US Health Center Program. These organizations account for a total of 8,526 observations from 2004 to 2012. All data for the main analyses were extracted from the Uniform Data System (UDS), a database containing annually reported administrative and aggregate patient and utilization data from all federally funded community health centers. The data were obtained from the HRSA via a Freedom of Information Act (FOIA) request.

Outcome and independent variables

The primary outcome of interest in this study was FQHC dental service delivery status, which was used as a measure of dental service availability. Dental service delivery status was analyzed as a binary variable: All FQHCs that reported delivering one or more dental services of any type during a calendar year were assigned to the "dental services delivered" group, while those that offered no dental services during a calendar year were assigned to the "no dental

services delivered" group. Our lack of information on the dental services provided by FQHCs through collaborative agreements is a recognized limitation of this study; however, FQHCs are located in medically underserved areas where significant travel times are commonly required in order to access the nearest source of dental care and so it is unlikely that these agreements result in high utilization of dental care. Additional research on the dental services delivered to FQHC patients through contractual agreement is needed.

The DHPPI was used as a baseline measure of state policy environment and served as our primary independent variable. The DHPPI was developed by the HRSA to quantify aspects of state policy environment for the dental hygiene workforce in 2001 (15). States were assigned numeric values and grouped into categories based on the level of professional independence afforded to the dental hygiene workforce by relevant policies/regulations. We analyzed the DHPPI as a 5-level categorical variable, wherein five represents the most supportive policy environment and one represents the most restrictive. Table 1 presents the distribution of FQHCs and observations as well as states by DHPPI category.

The DHPPI has a number of limitations. First, between 2001 and 2012, many states changed relevant dental hygiene policies, thereby likely influencing state-level professional practice and oral health system capacity. To account for this, all relevant policy changes that occurred from 2002 to 2011 were identified. A binary, state-level variable was then

Table 1 Dental Hygiene Professional Practice Index Categories: Description and Distribution of FQHCs and States

DHPPI level	Description	Unique FQHC grantees	Total grantee observations	Number of states represented	States
1	Restrictive	182	1438	8	NC, AR, GA, AL, KY, VA, MS, WV
2	Limiting	392	2920	21	KS, NH, TN, VT, OH, IN, NJ, IA, IL, MD, AK, MI, MA, WY, FL, RI, DC, DE, HI, ND, OK
3	Satisfactory	226	1669	11	UT, AZ, ID, SC, NE, WI, PA, SD, LA, MT, TX
4	Favorable	137	1012	6	CT, MO, NV, MN, ME, NY
5	Excellent	198	1487	5	CO, WA, OR, CA, NM

generated and included in the analyses to account for the effect of policy change. The details of the creation and use of this policy change variable are described in the Appendix. Second, the DHPPI quantifies professional practice environments for dental hygienists based on state policy, which may or may not be representative of dental hygienists' actual practice within that state. Therefore, the DHPPI values used in this study represent the state-policy context for the professional practice of dental hygiene rather than hygienists' actual practice.

Other covariates

Covariates comprised various administrative and aggregate patient characteristics from the UDS, including the number of clinical sites operated by an FQHC, primary geographic location served by the FQHC, proportion of total patients from racial and ethnic minority groups, proportion of Medicaid recipients, and proportion of uninsured patients. Additionally, we generated a variable representing the number of years an FQHC has received funding to adjust for the effect of time on FQHC dental service delivery status. Time 1 was assigned to each FQHC in the first year they had an observation and numbered sequentially thereafter.

This FQHC-level information also has some notable limitations. The number of health care professionals (including dental) practicing within an FQHC is considered proprietary information and therefore cannot be accessed for all FQHCs via a FOIA request. Therefore, we were unable to adjust for dental workforce capacity at the FQHC level. Although we did statistically control for workforce composition, given that it likely influences oral health service delivery within health care organizations, it must be noted that neither the capacity nor the composition of the oral health workforce within an FQHC was the focus of our study. Additional details of all independent variables and covariates are provided in Table 2.

Statistical analyses

Continuous variables were described by means and standard deviations (SD) and categorical variables by frequencies and percentages by dental service status. The longitudinal profiles of dental service status were modeled using generalized linear mixed-effects models. Random intercepts were adopted at both the state- and FQHC-level to account for within-state and within-FQHC correlations, such as Medicaid policies and FQHC workforce composition. Univariate regressions were run to evaluate unadjusted associations between dental service status and predictors. A backward model selection

Table 2 Independent Study Variables: Definition and Measurement

Variable	Definition	Value
Sites	The number of clinical sites operated by the health center grantee	>0
Geography	The percent urban geographic area served by health center grantee.	0 = rural 1 = urban
Race	Average proportion of patients from a racial or ethnic minority group for all years of UDS reporting period	>0
Poverty	Percent of patients at or below 200% poverty during reporting period	>0
Uninsured	The percent of uninsured patients served by health center grantee during reporting period	>0
Medicaid	The percent of Medicaid patients served by health center grantee during reporting period	>0
Workforce	State-level value indicating the dentists per 10,000 population	>0
Policy change	Key policy changes during the study period and for each year	0 = no changes 1 = changes
Time	The period of years an FQHC was represented in the UDS data	>0

Table 3 Characteristics by Dental Services Delivery and Regression Results for FQHC Observations from 2004 to 2012 ($n = 8,526$)

Variables	Dental services status		Simple longitudinal regression results	
	YES ($n = 6830$, 80.1%)	NO ($n = 1696$, 19.9%)	Odds ratio 95% CI	P-value
DHPPI range				
1 (1-30)	1044 (72.6%)	394 (27.4%)	0.51 (0.32, 0.80)	0.004*
2 (31-40)	2273 (77.8%)	647 (22.2%)	0.77 (0.47, 1.26)	0.310
3 (41-49)	1348 (80.8%)	321 (19.2%)	0.80 (0.47, 1.37)	0.420
4 (50-80)	907 (89.6%)	105 (10.4%)	1.14 (0.45, 2.90)	0.790
5 (81-100)	1258 (84.6%)	229 (15.4%)	ref	ref
Urban				
Yes	3282 (48.1%)	956 (56.4%)		
No	3548 (52.0%)	740 (43.6%)	0.84 (0.57, 1.25)	0.390
Policy changes occur in state				
Yes	5528 (80.9%)	1472 (86.8%)		
No	1302 (19.1%)	224 (13.2%)	0.66 (0.46, 0.95)	0.030*
Clinical sites	4.91 (\pm 2.59)	3.36 (\pm 2.29)	1.57 (1.47, 1.67)	<0.0001*
Proportion medicaid patients	0.29 (\pm 0.15)	0.23 (\pm 0.2)	189.40 (79.34, 452.3)	<0.0001*
Proportion in poverty	0.66 (\pm 0.25)	0.58 (\pm 0.27)	5.12 (3.13, 8.37)	<0.0001*
Proportion minority patients	0.47 (\pm 0.32)	0.41 (\pm 0.33)	1.29 (0.7, 2.39)	0.410
Proportion uninsured patients	0.39 (\pm 0.18)	0.37 (\pm 0.2)	0.59 (0.27, 1.27)	0.180
Dentist per 100,000	5.98 (\pm 1.33)	5.78 (\pm 1.29)	1.11 (0.97, 1.27)	0.140

*Significant at $P < 0.05$.

was adopted to choose the best multivariate model for evaluating the adjusted associations. Odds ratios, 95% confidence intervals, and p-values were generated. Two-sided p-values <0.05 were considered as statistically significant. All statistical analyses were performed using SAS© version 9.3 (SAS Institute, Cary, NC) (16).

Results

State policy environment

As shown in Table 3, the majority (80.1%) of FQHCs delivered dental services. The proportion of FQHCs that delivered dental services varied by DHPPI category. In general, we noted that states with policies supporting high levels of professional independence (i.e., Levels 4 and 5) had higher proportions of FQHCs delivering dental services than did those with policies restricting professional independence (Level 1). The greatest proportion (approximately 90%) of FQHCs delivering dental services was found in states with Level 4 policy environments. This finding was consistent across all years included in the study. Figure 2 depicts the proportion of FQHCs delivering dental services for each study year by DHPPI category, including the national average. Unadjusted regression models demonstrated that the odds of Level 1 FQHCs delivering dental services was approximately half (OR = 0.51; 95% CI = 0.32, 0.80) that of Level 5 FQHCs.

A number of administrative characteristics of FQHCs were significantly associated with dental service delivery status. FQHCs delivering dental services reported operating a greater number of clinical sites (4.91 sites) than did FQHCs not

delivering dental services (3.36 sites). Furthermore, FQHCs that delivered dental services reported a greater proportion of patients as living at or below 200% federal poverty level (FPL) (8% difference) and Medicaid recipients (6% difference) than did FQHCs that did not deliver such services. Additional descriptive statistics and unadjusted regression results are presented in Table 3.

Multivariate longitudinal regression results

Results for the longitudinal multivariate statistical analyses for this study are presented in Table 4. After adjusting for numerous factors, Level 1 FQHCs had 0.28 the odds of delivering dental services as did those located in Level 5 FQHCs. Additionally, the number of clinical sites (OR = 1.48, 95% CI = 1.38, 1.58), proportion Medicaid patients (OR = 20.79, 95% CI = 6.51, 66.44), and proportion at or below 200% FPL (OR = 4.09, 95% CI = 2.35, 7.13) were all significant predictors of dental service delivery status. The odds of dental service delivery also increased with each year of FQHC funding (OR = 1.09, 95% CI = 1.04, 1.15).

Discussion

Overall, the findings suggest that the state policy environment for the professional practice of the dental hygiene workforce to some extent influence the availability of dental services at FQHCs. We cannot confirm whether these findings solely reflect the influence of state policy as quantified by the DHPPI or whether DHPPI serves as a proxy or is correlated with some other factor within the state that influences oral health system capacity, such as Medicaid policies. That said,

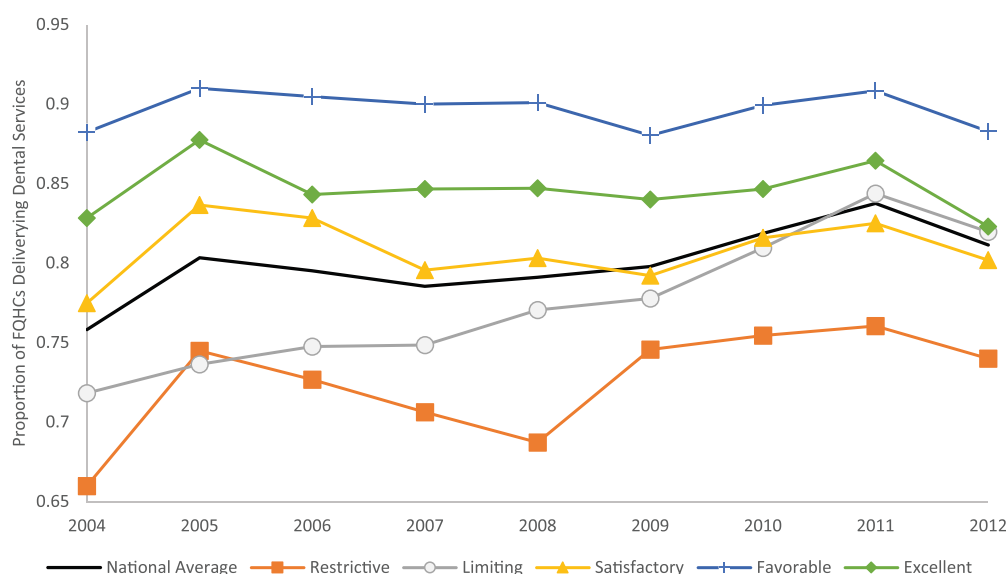


Figure 2 Temporal trends in FQHC dental service delivery status by DHPPI category.

it is unsurprising that we found fewer FQHCs delivering dental services in states restricting professional independence among a workforce focused on dental disease prevention and oral health promotion.

Our findings support the notion that state policy influences oral health system capacity within underserved communities. While the exact mechanism by which state policy affects FQHCs is unknown, FQHCs located in states with restrictive dental hygiene policies may not be able to leverage the dental hygiene workforce to the same extent as those located in states with fewer restrictions. For example, FQHCs located in Mississippi (a restrictive state) may not provide or bill for preventive dental services without direct supervision of dental hygiene practice, whereas those in Maine (a supportive state) can do so without dental oversight. Our findings are supported by a recent monograph by the National Association of Community Health Centers (NACHC) on oral healthcare delivery models at FQHCs in five states. Specifically, a FQHC in Colorado (one of the least restrictive states) that can bill for dental services provided by dental hygienists reported employing dental hygienists in their primary care clinics to provide preventive dental care and education. Conversely, a FQHC in Kentucky (one of the most restrictive states), which offered referrals for patients in need of dental services instead of directly providing said services, reported that relatively few referrals resulted in actual dental visits, and many of their patients went without dental care of any kind. Unlike the Colorado FQHC, the Kentucky FQHC could not employ dental hygienists or bill for dental services. This NACHC monograph supports the theory that state policy influences the workforce delivering dental services at FQHCs. However, further information on the FQHC-level workforce is needed to explore this finding in detail.

Interestingly, most FQHCs delivering dental services were located in states with favorable policy environments (i.e., Level 4), rather than in those with excellent environments (i.e., Level 5). This was observed consistently over the studied decade and after adjusting for numerous factors. Many states assigned to the favorable policy group in 2001 had provisions promoting greater professional independence for dental hygiene practice in public health settings, which is generally interpreted as including FQHCs. Thus, the policies within these states may have incentivized, to some extent, the dental hygiene workforce to seek employment in public health settings to obtain greater professional independence. In contrast,

Table 4 Results of Longitudinal Analyses with DHPPI as Ordinal Measure: Predictors of Dental Services Status ($n = 1,135$)

Variables	All years	
	Odds ratio 95% CI	P-value
DHPPI range		
1 (1-30)	0.28 (0.09, 0.93)	0.04*
2 (31-40)	0.43 (0.15, 1.21)	0.11
3 (41-49)	0.62 (0.19, 1.99)	0.43
4 (50-80)	0.92 (0.23, 3.62)	0.98
5 (81-100)	Reference	Reference
Policy Change	0.62 (0.27, 1.42)	0.26
Clinical Sites	1.48 (1.38, 1.58)	<0.0001*
Medicaid	20.79 (6.51, 66.44)	<0.0001*
200% Poverty	4.09 (2.35, 7.13)	<0.0001*
Time	1.09 (1.04, 1.15)	<0.0001*

Note: Covariates were included based on results of cross-sectional regression analyses. The PROC GLIMMIX procedure was used. Adjustments were made for repeated measures of grantees and clustering of grantees at the state-level.

* Significant at $P < 0.05$. CI, confidence interval.

while Level 5 states afford the highest level of professional independence to the dental hygiene workforce in all practice settings, they may not offer the same incentives to practice in FQHCs. Additional research is needed to understand this finding and validate this theory.

We noted several other factors that played significant roles in dental service delivery status, such as the proportion of patients who were Medicaid recipients. This finding was expected because Medicaid is an important source of reimbursement for health centers. Also unsurprisingly, the number of clinical sites significantly predicted FQHC dental service delivery status. Theoretically, a greater FQHC capacity leads to serving more patients, which in turn leads to greater revenue generated and therefore a greater likelihood of providing dental services directly. The finding that the proportion of patients living at or below 200% FPL significantly predicted dental service delivery status is also unsurprising, as providing care to such populations is FQHCs' primary mission. Our finding demonstrates that they have been thus far successful in this mission.

Research and policy implications

This study has significant implications for dental public health research and policy. Research and policy efforts rely on comparable data on the dental safety net across states (5). The UDS data offer information on the FQHC system, which is recognized as the most important component of the safety net. Although these data have numerous limitations, they enable researchers to examine dental service utilization within the safety net and provide a platform for studying the effects of state policy. The utility of the UDS data is likely to improve with the inclusion of dental quality measures in annual reports and the adoption of interoperable electronic health records systems, which is in the process of being implemented (17).

The need for systematic tracking and evaluation of state policy to determine its impact on oral health care delivery and oral health has recently been recognized (18). This study offers a framework by which the impact of state policy on underserved communities can be examined. Although we only examined workforce policy, the framework is applicable to other dental public health issues for which objective data are needed to inform policy discussions and development. It must be noted, however, that the DHPPI was not updated over the study period. Ideally, a state policy indicator should be updated on an annual basis to enable accurate tracking over time.

The findings from this study are a "first step" toward understanding the relationship between-state policy and oral health delivery within the dental safety net. Despite the limitations of this study, our findings have implications at the federal, state, and FQHC levels. At the federal level, the HRSA should collaborate with key researchers to better understand the effects state policy has on dental service delivery in under-

served communities, such as by enabling access to the additional FQHC-level data needed. At the state-level, our findings should be used to encourage dialogue on state regulation of the oral health workforce and dental safety-net capacity by the State Offices of Primary Care, State Dental Directors, Primary Care Associations, oral health professionals, and stakeholders with an interest in advancing policies that promote access and oral health.

Finally, at the FQHC level, our findings highlight the necessity of improving FQHCs' productivity, which has been consistently identified as the single most important strategy for increasing dental safety-net capacity (5,6). Simultaneously, preventing and managing dental disease may be the "single best approach" to reducing oral health inequities (19). As FQHCs' dental service requirements align with dental hygienists' professional focus, FQHCs may be able to better leverage this workforce to increase dental service availability and productivity. A number of FQHCs are already doing so, having embedded dental hygienists into their primary care clinics as a way of expanding preventive services for patients (20), or employing dental hygienists in school-based dental programs to expand the reach of preventive services such as dental sealants (21). Of course, such models can only be employed by FQHCs if state policy permits dental hygienists to function in these capacities.

Limitations

As noted above, our findings have several important limitations, mainly related to the lack of certain data and the need for numerous assumptions, such as that the DHPPI provides an accurate representation of the professional practice environment of dental hygienists within states. Importantly, data on numerous factors at the state and FQHC level, such as Medicaid policy and patient encounter rates, were not available. To account for the potential bias of these factors, we adjusted for random effects at the state and FQHC level. Nevertheless, to estimate the influence of state policy environment on FQHCs more precisely, researchers should obtain additional FQHC-level data from the US Health Center Program.

Conclusion

In summary, our results suggest that the state health workforce policy environment may influence the availability of dental services within FQHCs. Fewer FQHCs in states with policies restricting professional independence among dental hygienists deliver dental services compared to those located in states with policies supporting professional independence, especially in public health settings. Additional research is needed to understand the specific ways in which state workforce policies affect dental service delivery at FQHCs, and to

determine whether these policies influence access to dental care and oral health within the populations served by FQHCs.

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